

**REMARKS**

Claims 1-12 are now present in this application, with new claims 6-12 being added by the present Preliminary Amendment. It should be noted that the amendments to original claims 1-5 of the present application are non-narrowing amendments, made solely to place the claims in proper form for U.S. practice and not to overcome any prior art or for any other statutory considerations. For example, amendments have been made to broaden the claims; remove reference numerals in the claims; remove/change any phrases unique to European practice; remove multiple dependencies in the claims; and to place claims in a more recognizable U.S. form, including the use of the transitional phrase "comprising" as well as the phrase "wherein". Other such non-narrowing amendments include placing apparatus-type claims (setting forth elements in separate paragraphs) in a more recognizable U.S. form. Again, all amendments are non-narrowing and have been made solely to place the claims in proper form for U.S. practice and not to overcome any prior art or for any other statutory considerations.

**CONCLUSION**

Accordingly, in view of the above amendments and remarks, an early indication of the allowability of each of claims 1-12 in connection with the present application is earnestly solicited.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is


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respectfully requested to contact Donald J. Daley at the telephone number of the undersigned below.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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**ABSTRACT OF THE DISCLOSURE**

An electric power circuit breaker includes a connecting bar against which an arcing horn rests with an attaching limb. The connecting bar extends through an opening of a rear wall of the housing. In order to connect the arching horn to the connecting bar, a projection is provided on the attaching limb of the arcing horn and a recess that accommodates the projection is provided on the connecting bar. When inserting the connecting bar with the arching horn resting thereon, the attaching limb of the arching horn is covered by a collar mounted on the housing. The attaching device grasp a fillet located on the underside of the connecting bar.

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## **SUBSTITUTE SPECIFICATION**

### **Description**

#### **ELECTRICAL power-POWER CIRCUIT BREAKER having** **COMPRISING A CONNECTING rail-BAR AND AN ARCING HORN**

[0001] This application is the national phase under 35 U.S.C. § 371 of PCT International Application No. PCT/DE03/01261 which has an International filing date of April 10, 2003, which designated the United States of America and which claims priority on German Patent Application number DE 102 19 558.7 filed April 26, 2002, the entire contents of which are hereby incorporated herein by reference.

### **Field of the Invention**

[0002] The invention generally relates to an electrical power circuit breaker having a housing and having a connecting rail-bar accommodated in an opening in the housing. Preferably, it relates to one wherein, the end of said the connecting rail-bar which protrudes into the housing being is part of a switching contact arrangement and bearing bears an arcing horn which has a fixing limb resting on the connecting railbar.

### **Background of the Invention**

[0003] A power circuit breaker of the type mentioned is described, for example in DE 198 19 165 A1. In this case, a screw acts as a common fixing means-device for the connecting railbar and the supported arcing horn, in order to simplify the assembly of these parts when producing the power circuit breaker. This takes place by a web arranged on the underside of the connecting railbar being supported on the inner side of the housing, and, B-by this means, the position of the

inner end face, which is associated with the switching contact arrangement, of the connecting ~~railbar~~ being-is determined.

[0004] Counter to inward movement of the connecting ~~railbar~~, a stop bar is provided on the arcing horn, and is supported on the outside of the housing of the power circuit breaker. The arcing horn and the connecting ~~rail-bar~~ are connected to one another and at the same time fixed against being moved in both directions by ~~means-way~~ of fixing ~~means-device~~ engaging in the connecting ~~railbar~~ and passing through the supported fixing limb.

[0005] For assembly purposes, the arcing horn is initially inserted in the opening, which is provided for the purpose of passing through the connecting ~~railbar~~, of the housing, in order to position the stop bar. The connecting ~~railbar~~ is then inserted, the level of the opening in the housing thus corresponds to the overall level of the connecting ~~railbar~~ and the fixing limb of the arcing horn.

#### SUMMARY OF THE INVENTION

[0006] An embodiment of ~~t~~The invention ~~is-based-on~~ theincludes an object of simplifying the assembly of the connecting ~~railbar~~ and arcing horn and of improving the accessibility of the fixing ~~means-device~~ for the arcing horn.

[0007] ~~An~~This object may beis achieved according to an embodiment of the invention by at least one projection pointing toward the connecting ~~railbar~~ being formed on the fixing limb of the arcing horn, and by the connecting ~~railbar~~ having a recess corresponding to the projection.

[0008] This design of the connecting ~~rail~~bar and the arcing horn makes it possible for the two parts to be brought into the relative position envisaged by ~~means~~ way of the projection and the recess prior to assembly of the power circuit breaker in the housing, and to assemble both of them in the housing in this position. Connecting the arcing horn and the connecting ~~rail~~bar by ~~means—use~~ of the abovementioned projection and the corresponding recess makes it possible to select a fixing ~~means—device(s)~~ engaging with the connecting ~~rail~~bar. This has the advantage that the fixing device(s) ~~means~~ can be attached at a point which is more effectively protected against the influence of switching arcs.

[0007] The projection provided on the fixing limb of the arcing horn may in the context of an embodiment of the invention be in the form of a bent-back edge, the recess provided for accommodating the projection being in the form of a groove. In particular when, according to a further feature of an embodiment of the invention, the fastening limb is as wide as the connecting ~~rail~~bar, —,

[0009] and the bent-back edge extends over the entire width of the fixing limb and the recess extends over the entire width of the connecting ~~rail~~bar, a stable connection, which thus corresponds to the operational requirements, is achieved between the arcing horn and the connecting ~~rail~~bar.

[0010] The opening provided in the housing for the power ~~breaker~~ circuit breaker for the purpose of accommodating the connecting ~~rail~~bar, as is also the case with the arrangement according to the abovementioned DE 198 19 165 A1, be dimensioned such that the connecting ~~rail~~bar and the fixing limb of the arcing horn are at the same levels. However, instead of this,

according to a further development of an embodiment of the invention, the opening in the housing may be matched to the cross-sectional form of the connecting ~~railbar~~, and a collar which covers the fixing limb of the arcing horn at the top and at the sides may be integrally formed on the housing. Such a collar can be designed such that it extends in the vicinity of the arc-guiding part of the arcing horn and thus prevents a movement or movement.

**[0011]** As has already been mentioned, an embodiment of the invention avoids fixing ~~means~~ device(s) which pass through the fixing limb of the arcing horn. For common fixing purposes, it is recommended to provide on the connecting ~~railbar~~ an integrally formed web in the form of a stop ~~means~~ device(s) on the housing, as is already known from DE 198 19 165 A1. This web is gripped and pushed against the housing by fixing device(s) ~~means~~ which can be operated from the outside of the housing.

**[0012]** The invention is described in more detail below with reference to the exemplary embodiment illustrated in the figures.

**[0013]** Figure 1 shows a section through a region of a low-voltage power ~~breaker~~ circuit breaker which is ~~essential to~~ part of an embodiment of ~~the~~ invention.

**[0014]** Figure 2 shows an enlarged, perspective illustration of a detail of a housing of the low-voltage power ~~breaker~~ circuit breaker shown in figure 1.

#### **DETAILED DESCRIPTION OF THE EXEMPLARY EMBODIMENTS**

**[0015]** The low-voltage power ~~breaker~~ circuit breaker 1 shown in figure 1 has, in a known manner, a housing 2 having a rear wall 3 and preferably two or more switching contact arrangements 4. A drive device 5

serves the purpose of simultaneously actuating the switching contact arrangements 4. These each have a contact carrier 6 and a contact lever 7 arranged thereon such that it can move counter to the spring force. Contact pieces or contact faces interacting with the contact levers 6 are fitted to an upper connecting ~~railbar~~ 10 which projects into the housing 2 and bears an arcing horn 11. Located above the switching contact arrangements 4 are arc-quenching chambers 12. In addition to the abovementioned upper connecting ~~railbars~~ 10, lower connecting ~~railbars~~ 13 which are connected to the contact levers 7 by means of flexible conductors 14 serve the purpose of connecting the switching contact arrangements 4 to an external circuit.

**[0016]** In addition, figure 1 shows a screwless connection of the arcing horn 11 to the upper connecting ~~railbar~~ 10. The arcing horn 11 has a horn element 15, which serves the purpose of guiding switching arcs, and a fixing limb 16. The end of the fixing limb 16 is provided with a projection 17, which is in the form of a bent-back section, a recess 20 in the form of a groove being fitted to the upper side of the connecting ~~railbar~~ 10 for the purpose of accommodating ~~said the~~ projection 17. The fixing limb 16 and the connecting ~~railbar~~ 10 have the same width. The recess 20 correspondingly extends over the entire width of the connecting ~~railbar~~ 10.

**[0017]** Further details and the procedure for assembly can be seen in more detail in figure 2 which shows an enlarged, perspective illustration of the region of the upper connecting ~~railbar~~ 10 and the arcing horn 11. As is indicated by an arrow 21, for the purpose of connecting it to the connecting ~~railbar~~ 10, the fixing limb 16 of the arcing horn 11 is brought to bear over a



large area on the upper side of the connecting ~~railbar~~ 10 such that the projection 17 is inserted into the recess 20 in the form of a groove. This assembly is then inserted into an opening 23 in the direction of a further arrow 32, ~~said the~~ opening 23 being provided in the rear wall 3 of the housing 2 of the power ~~breaker~~ circuit breaker 1. In this case, the opening 23 matches the connecting ~~railbar~~ 10. In addition, a collar 24, which covers the fixing limb 16 and also overlaps the said fixing limb 16 laterally with lateral side pieces 25, is integrally formed on the rear wall 3 above the opening 23.

**[0018]** For the purpose of finally fixing the connecting ~~railbar~~ 10 to the arcing horn positioned on it, fixing ~~means—devices~~ are provided which are accessible on the outside of the housing 2 or the rear wall 3. The arrangement of the fixing ~~devices~~ means can be seen in more detail in figure 1. Figure 1 shows how a web 26 arranged on the underside of the connecting ~~railbar~~ 10 is gripped by a nut 27 in the form of a pressure piece. A retaining screw 30 which passes through the rear wall 3 engages in the nut 27 and presses the connecting ~~railbar~~ 10 by ~~means—use~~ of its web 26 on the inside against the rear wall 3. In this case, a head 31 of the retaining screw 30 is located on the outside of the rear wall 3 and is thus easily accessible for use. The fixing limb 16 of the arcing horn 11, on the other hand, is free of fixing ~~devices~~ means and is largely covered and protected on its upper side by the collar 24.

[0019] The further parts of a switching pole of a low-voltage power ~~breaker~~circuit breaker of those parts shown correspond to a conventional physical design as are described, for example, in EP 0 898 779 B1 and are therefore not described in any more detail.

[0020] The recess 20 in the connecting ~~railbar~~ 10 may expediently be introduced when the connecting ~~railbar~~ 10 is produced by ~~means~~way of profiling, in the same manner as the web 26. It is therefore tolerable to produce the recess 20 by separately machining the connecting ~~railbar~~ 10.

[0021] Exemplary embodiments being thus described, it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the present invention, and all such modifications as would be obvious to one skilled in the art are intended to be included within the scope of the following claims.